META MEC
LG Industrial Systems

# LG Digital Motor Protection Relay

- Specifications of D-EMPR
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- Dimensions
- DMP-S/SE/T/TE
- DMP-SZ/SEZ/TZ/TEZ
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99 -12

Good Design, ISO 14001, ISO 9001

META MEC

# Digital Motor Protection Relay

Meta-MEC Series

# DIGITAL EMPR

LG Industrial Systems

# Digital
# Motor Protection Relay

- General digital type motor protection relays using MCU(Micro Controller Unit)
  -Real time processing and high precision

- Multiple protection

| Protection | DMP□-S | DMP□-SZ | DMP□-SI | DMP□-SE | DMP□-SEZ | DMP□-SEI | DMP□-T | DMP□-TZ | DMP□-TI | DMP□-TE | DMP□-TEZ | DMP□-TEI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wiring | Screw type | | | | | | Tunnel type | | | | | |
| Panel mount | Unit type | | | Extension type | | | Unit type | | | Extension type | | |
| Over current | | | | | | | | | | | | |
| Under current | | | | | | | | | | | | |
| Stsll | | | | | | | | | | | | |
| Lock | | | | | | | | | | | | |
| Phase failure | | | | | | | | | | | | |
| Revers phase | | | | | | | | | | | | |
| Asymmetry | | | | | | | | | | | | |
| Grount fault | | | | | | | | | | | | |
| Short circuit | | | | | | | | | | | | |

- Install the Unit /Extension type in one body

  The display part may be seperated from the body
  You can check the values and the causes of the
  fauit without opening the distrioution panel door

*Fig. (D-EMPR in the MCC unit)

- Both screw type and tunnel type
  wirings are available in a DMP-E
  Type D-EMPR

  Simply detach the screw terminal, you can use it by
  the tunnel type reiay

- Standard: IEC60947-1, IEC60947-4-1, IEC60947-5-1,
  UL508, KSC4504
- Certification & approval: CE, UL/CSA, Lloyd register,
  Korea legister, KS, ISO 14001,
  ISO 9001(Including proceedings)

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## Display the causes of the fault and the values

Prompt A/S by looking the LED panel which displays the causes of the fauit and the values

## 3phase digital ampere-meter function (Digital ampere-meter)

Additional ampere-meter is not needed

R phase current value value

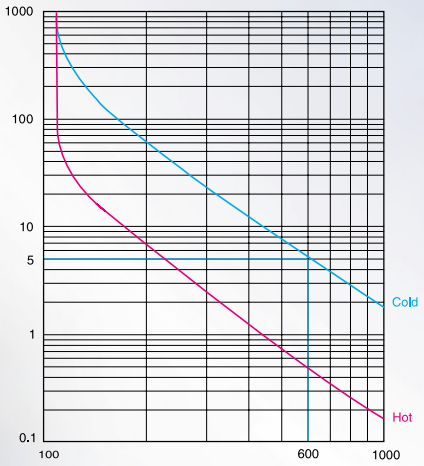
S phase current value

T phase current

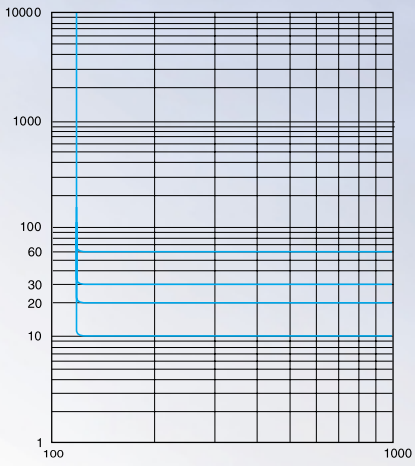
## Motor load rate(%)

Easy to check the motor load condition

## Selectable either the inverse time or definite time characteristics




Defiinite time characteristics




Inverse time characteristics

## Applicable to the inverter contol circuit

LG DMPR has high performance under the harmonic noise and can be used in the Inverter control circuit (20~200Hz)

## Elegant design

High class product image by the elegant design

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# Specifications of D-EMPR

*Digital EMPR*

DMP□-S

DMP□-T

DMP□-SE

DMP□-TE

| Model No. | | | DMP06-S | DMP60-S | DMP06-T | DMP60-T | DMP06-SE | DMP60-SE | DMP06-TE | DMP60-TE |
|---|---|---|---|---|---|---|---|---|---|---|
| Wiring | | | Screw type | | Tunnel type | | Screw type | | Tunnel type | |
| Panel mount | | | Unit | | | | Extension (Note1) | | | |
| Operation time | | | Select either reverse time characteristics or definate time characteristics | | | | | | | |
| Protection | Over current | | According to the setting time | | | | | | | |
| | Phase failure | | 3 sec. | | | | | | | |
| | Reverse phase | | Within 0.1 sec. | | | | | | | |
| | Asymmetry | | 5 sec. | | | | | | | |
| | Stall | | 5 sec. | | | | | | | |
| | Lock | | Within 0.5 sec. | | | | | | | |
| | Under current | | 3 sec. | | | | | | | |
| | Ground fault | | Within 0.05~1 sec. Selectable (0.05~1.0sec) | | | | | | | |
| | Short circuit (Note2) | | Within 50ms | | | | | | | |
| Alarm | | | Variable (60~110% of the setting current) | | | | | | | |
| Current setting range (A) | | | 0.5~6 | 5~60 | 0.5~6 | 5~60 | 0.5~6 | 5~60 | 0.5~6 | 5~60 |
| **Motor capacity** (kW) | | 220~240V | 0.09~0.75 | 1.1~11 | 0.09~0.75 | 1.1~11 | 0.09~0.75 | 1.1~11 | 0.09~0.75 | 1.1~11 |
| | | 380~440V | 0.12~1.5 | 2.2~22 | 0.09~1.5 | 2.2~22 | 0.09~1.5 | 2.2~22 | 0.09~1.5 | 2.2~22 |
| Time setting range (sec) | Definate time | Delay in starting | 0~60sec | | | | | | | |
| | | Delay in operating | 0~30sec | | | | | | | |
| | Inverse time | | 0~60sec | | | | | | | |
| | Reset | | Manual reset | | | | | | | |
| Tolerance | Current | | ±5% | | | | | | | |
| | Time | | ±5%(or ±0.5sec) | | | | | | | |
| Operating power (Note3) | | Voltage | AC 190~250V | | | | | | | |
| | | Frequency | 60Hz (50Hz) | | | | | | | |
| Aux. contact | OL | 2-SPST | 3A/250Vac Resistive load | | | | | | | |
| | AL | SPST | 3A/250Vac Resistive load | | | | | | | |
| Insulation resistance | | | Over DC 500V 100㏁ | | | | | | | |
| Surge impulse voltage(IEC1000-4-5) | | | 1.2×50㎲ 6kV (Apply standard wave form) | | | | | | | |
| Fast transient burst(IEC1000-4-4) | | | 2.5kV/5min | | | | | | | |
| Environment | Temperature | Operation | -25~70℃ | | | | | | | |
| | | Storage | -30~80℃ | | | | | | | |
| | Humidity | | 30~90%RH (No freezing) | | | | | | | |
| Display | 7-Segment | | 3 phase current, cause of a fault | | | | | | | |
| | Bar-Graph | | 60~110% of real load current | | | | | | | |
| Mounting type | | | 35mm Din-rail/Panel | | | | | | | |

Note1) In extension type, the digital EMPR is calibrated with combining the display past and mainbody so, please cautious not to combine the display part and main body with different part No.

Note2) Instantaneous short circuit protection is optional

Note3) Operational voltage of AC 110V and 50Hz is optional

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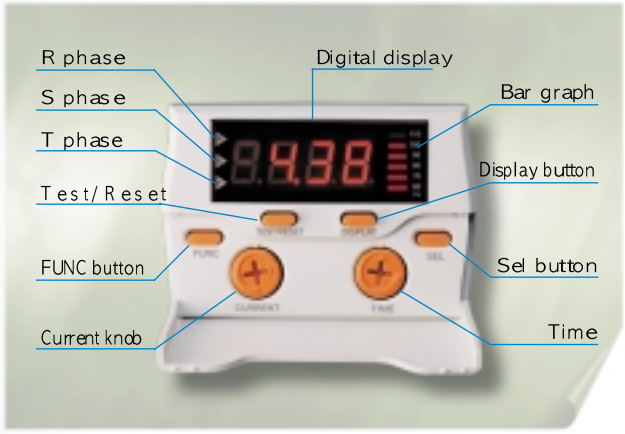
Before operating a motor, set the D-EMPR as follows

## 1. Check the operation of the Test/Reset button

❖ Check the operation when it is tripped

1) Check the wiring method (Refer to P13~14)
2) Press the Test/Reset button and then test is displayed on the LED and the DMPR is tripped
3) Press the Test/Reset button again and then it is reset

Note) In order to avoid the trip fault, the push operation of Test/Reset is not avaiable when a motor is rotating




## 2. Shift the mode by pressing the FUNC key and then select the values by press the Sel key

❖ You can finish the setting by pressing the Sel key in the Sto mode

❖ To protect the operation under the motor rotating, setting is allowed only in the test mode

| FUNC | Sel | Functions | Note |
|---|---|---|---|
| 1.CHA | Inu/dEF | Inverse or definite time characteristics | Default is inverse time characteristics |
| 2.dEF | 0~30 | Set the O-time (Definite time only) | For D-time setting, use the time knod |
| 3. r.P | oFF/on | Reverse phasse protection | Default is "Off" |
| 4.Und | oFF/30~70(%) | Under current protection | Default is "Off" Note1) |
| 5.ALt | oFF/60~110(%) | Alarm function (With pre-alarm function) | Default is "Off" |
| 6.StL | oFF/on | Stall function | Default is "Off" |
| 7.Loc | oFF/200~900(%) | Lock function | Default is "Off" |
| 8. Ct | 1~120 | CT ratio | Default is 1:1 Note2) |
| 9. P.F | on/oFF | Phase failure | Default is "On" |
| Sto | Sto | Store | |

Note1) Set the under current value from above 350mA
Note2) Do not change the CT ratio in 60 type (Dafault is 10:1)

1) Fist shift to the test mode by press the "Test/Reset" button and then set the functions by press the "FUNC" button
2) Each time you press the"FUNC" button, the function mode switches from 1.CHA mode to Sto mode. When the mode that you want to change is displayed, push the "Sel" button to select the value you want. After you select the value, press the "FUNC" button to finish the settings and it displays the next mode
3) If no button is pressed in the selection mode, it remains in that mode
4) If you select the inverse time characteristics it skips the mode 2 (Definite O-time) and go to the mode 3 (Reverse phase)

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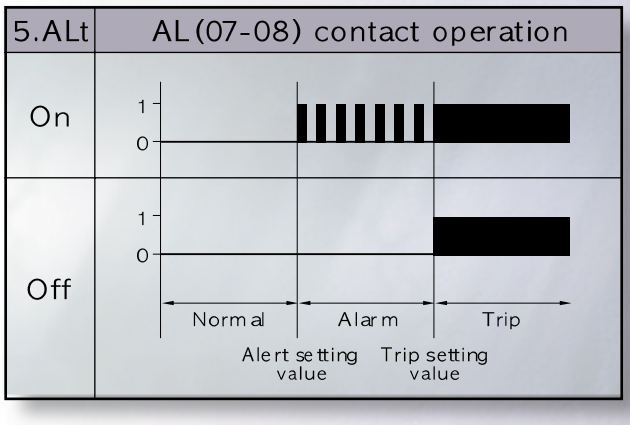
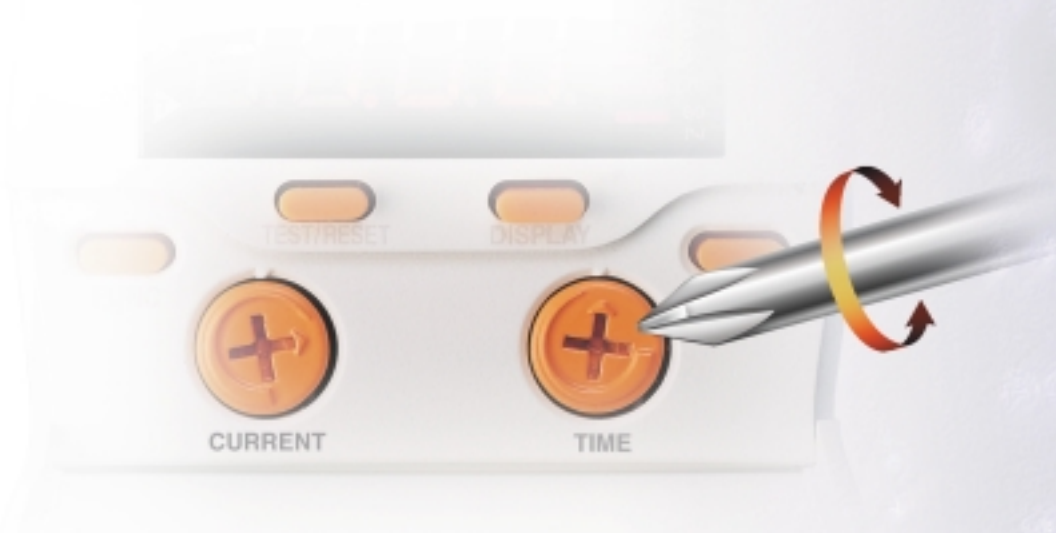
5) 5. Alt is the alert setting mode. It displays the load rate of the current setting value by the bar LED (60~110%)
- If the current is higher than the setting value, the bar LED is swieched on and off and the AL relay(07-08) make close and open in 1sec interval unitl the EMPR is tripped (Pre-alarm function)
- If the 5. Alt mode is set to off, the AL relay make close after the EMPR is tripped (Normal open contact)

6) To finish the settings you have to press the "Sel" button in the Sto mode

Alam signal (Alert function)




### 3. Adijust the operating time by the time knod




**Inverse time characteristics**

1) Select the inverse time in the 1. CHA mode, the default operating time is 600% of the rated current
2) The setting range of the operating time is 0~60sec. Set the time by considering the motor start time
3) When it is over the setting time, the EMPR operate in accord with the hot curve

**Definite time characteristics**

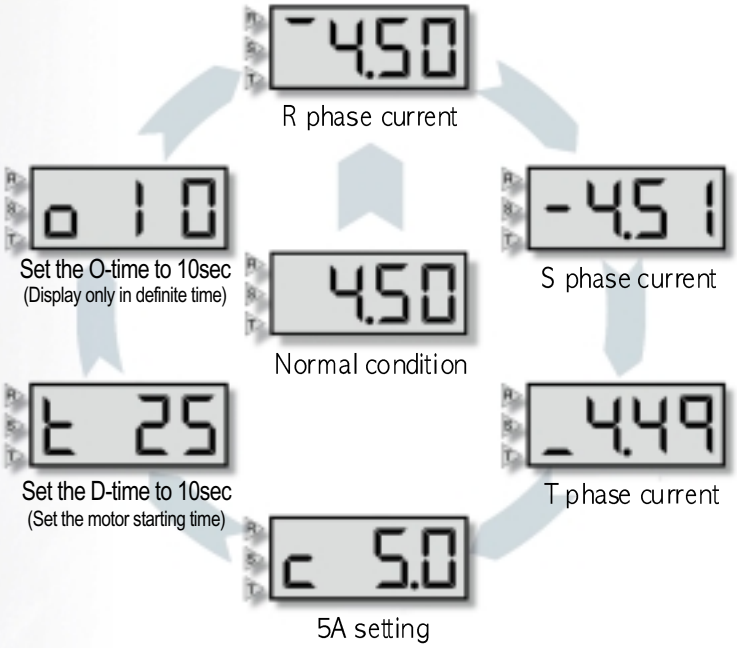
1) Select the definite in the 1. CHA mode, it is operated by the definite time characteristics
2) D-time means the time that delays the operating time when the motor is starting
3) The setting range of the operating time is 0~60sec. Set the time by considering the motor start time
4) Set the O-time at the setting mode 2. dEF and the range is 0~30sec

### 4. Adjust the operating current by the current knob

1) Set the operating current based on the rated current that is discribed in the name plate. Gennerally set the 110~115% of the real load current in the normal load condition
2) There ara 2 CT types according to the current range (0.6 / 60). When you use the external CT you can see the real current by set the CT ratio (In 60CT type the defaut CT ration is 10:1)
3) You can easily set the current value by refer to the load rate which is displayed on the bar-graph (Approx. 90% load rate)

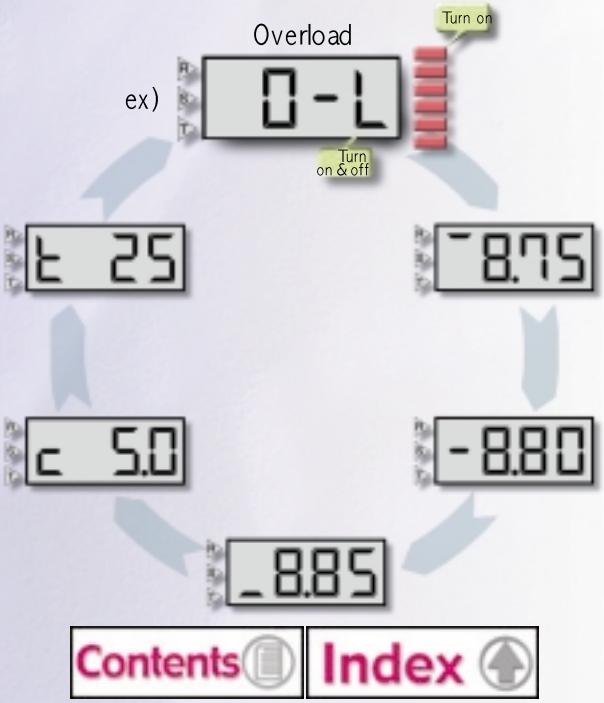
### 5. Check the setting state by the display key

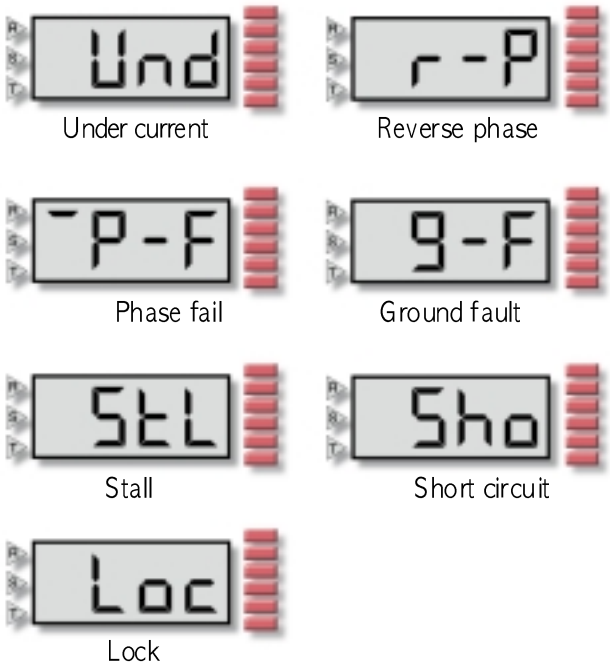
1) In normal condition it display the maximum current among the three phase current
2) Each time you press the "Display" button you can see the current and values as PIG X
3) If no button is pressed for 3~4 seconds. it returned to the normal condition

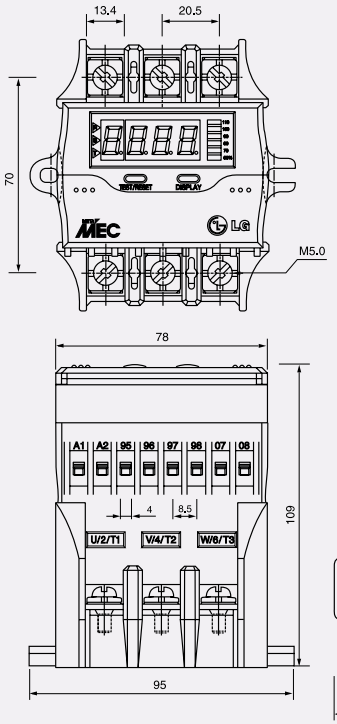
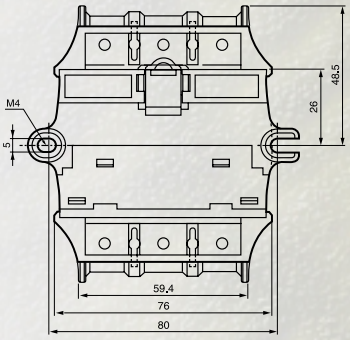
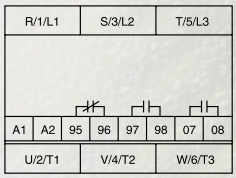
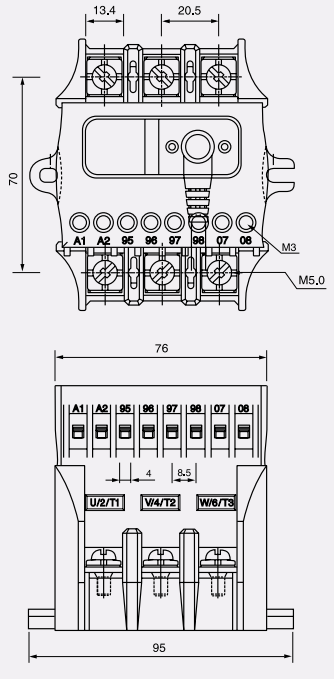
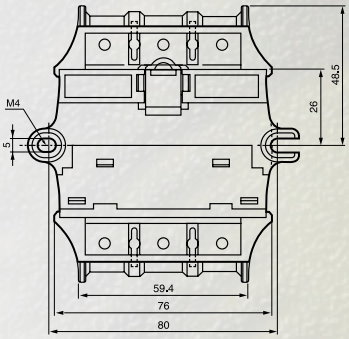
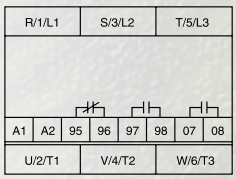



### 6. Check the causes of the fault by look at the display part

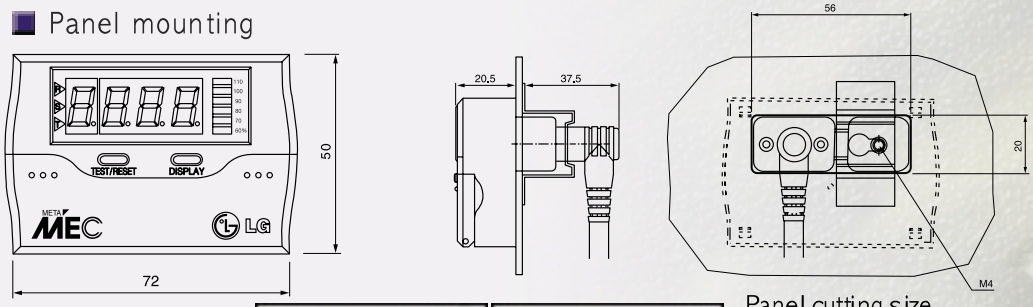
❖ The causes of the fault is switched on and off for 0.5sec interval. If you press the "Display" button at this time, display you can see the values and the causes of the fault



| Type | Dimensions | Mounting dimensions |
|---|---|---|
| DMP□-S<br>DMP□-SZ |  ※Aux. contact wire size :below 8 (mm²)<br>※Torque : 0.5N |  <br>  |
| DMP□-SE<br>DMP□-SEZ |  |  <br>  |

■ Panel mounting




Panel cutting size

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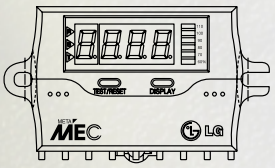
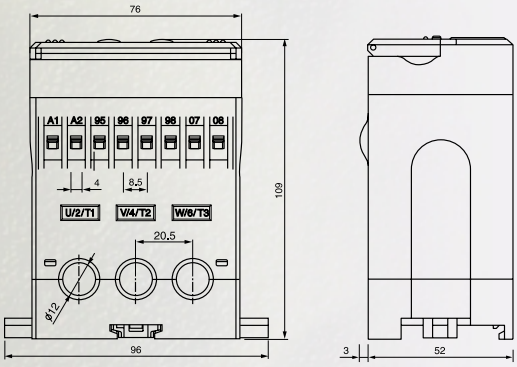
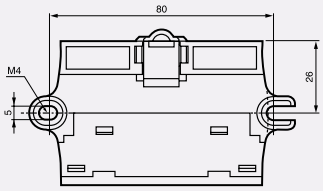
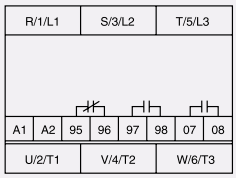
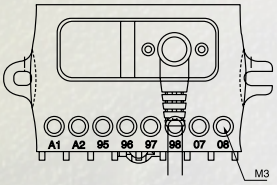
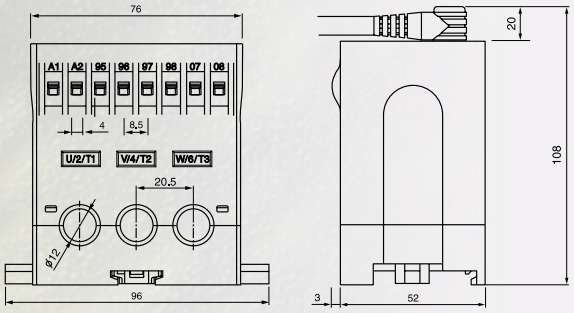
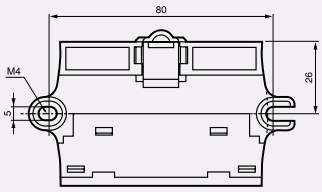
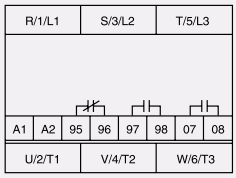
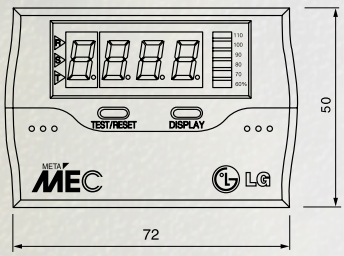
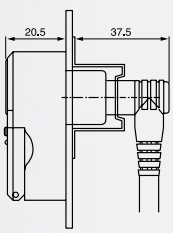
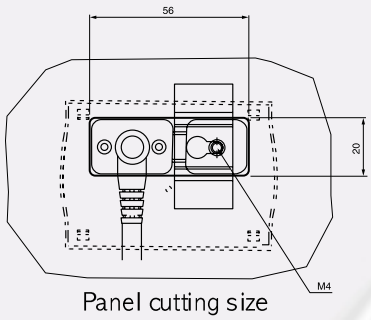
| Type | Dimensions | Mounting dimensions |
|---|---|---|
| DMP□-T<br>DMP□-TZ |  <br>※Wire size to penetrate a CT<br>:below 22 (mm²)<br>  |  <br>  |
| DMP□-TE<br>DMP□-TEZ |  <br>  |  <br>  |

■ Panel mounting




Panel cutting size

Note1) In extension type, the digital EMPR is calibrated with combining the display unit and mainbody so, pleose cauyious not to combine the display unit and mainbody with different part No.
Note2)The 07-08 contacts ara the ZCT input terminal (Digital EMPR with ground fault function)

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# DMP-S/SE/T/TE

*Digital EMPR*

## DMP-S/SE/T/TE

**Over-current/Under current/Phase failure/Asymmetry**
**Stall/Lock/Instantaneous short circuit protection**

- Unit type or extension type is available
  - Extension type:Remotely mounts the display unit on the panel surface
- 3 phase ampere meter function:Check the 3 phase current and setting value by press the display button
- Select the inverse time or definite time
- Easy to operate:Set the most function by the operation button and knod
- Display the causes of the fault and the values
- Alarm setting:Load ratio is displayed up to setting current
- Instantaneous current function is option

### Protect function

| | | |
|---|---|---|
| **Over current** | Depend on setting time | Selectable the inverse/definite |
| **Phase loss** | Within 3seconds | Over 70% of the rate of unbalance |
| **Phase unbalance** | Within 5seconds | Over 50% of the rate of unbalance |
| **Phase reverse** | Within 0.1seconds | Function enable |
| **Stall** | Within 5seconds | Over 180% of the setting current |
| **Lock** | Within 0.5seconds | Setting 200~900% of rated current |
| **Under current** | Within 3seconds | Setting 30~70% of rated current |
| **Instantaneous current**(Note1) | Within 50seconds | Setting 300~1800% of rated current |

☞Lock protection is operated after setting D-time in case of definite time type

### Function selection

| FUNC | Sel | Description |
|---|---|---|
| **1. CHA** | Inv/dEF | Operating characteristics setting(Inverse/definite time type) |
| **2. dEF** | 0~30(S) | Setting the operating time(In definite type) |
| **3. r.P** | oFF/on | Phase reverse enable |
| **4. Und** | oFF/30~70(%) | Under current enable and setting |
| **5. Alt** | oFF/60~110(%) | Alerting enable and setting |
| **6. Stl** | oFF/on | Stall enable |
| **7. Loc** | oFF/200~900(%) | Lock enable and setting |
| **8. Ct** | 1~120 | CT ratio setting |
| **9. P.F** | on/oFF | Phase fault enable |
| **Sto** | Sto | Store |

☞ 2.dEF is only displayed when dEF is selected in a 1.CHA mode

### Ratings

| Model | | | DMP□-S | DMP□-SE | DMP□-T | DMP□-TE |
|---|---|---|---|---|---|---|
| **Type** | Wiring method | | Screw | Tunnel | | |
| | Panel mount | | Unit | Extension | Unit | Extension |
| **Operating characteristics** | | | Inverse/definite type | | | |
| **Alerting function** | | | Variable between 60 and 110% | | | |
| **Current range(A)** | DMP06-□ | | 0.5~6 | | | |
| | DMP60-□ | | 5~60 | | | |
| **Setting time** | Definite | Delay(D-T) | 0~60seconds | | | |
| | | Operating(O-T) | 0~30seconds | | | |
| | Inverse | | 0~60seconds | | | |
| | Reset type | | Manual reset | | | |
| **Operating voltage** | Voltage | | AC 190~250V | | | |
| | Frequency | | 60Hz (50Hz) | | | |
| **Aux. contacts** | OL | 2-SPST(95~98) | 3A/250Vac resistive load | | | |
| | AL | SPST(07-08) | 3A/250Vac resistive load | | | |
| **Indicate** | 7-segment | | 3-phase current value, fault cause | | | |
| | Bar-LED arrys | | Load ratio (60~110%) | | | |
| **Mounting** | | | 35mm Din-rail/Panel | | | |

Note) Instantaneous current protection function is option

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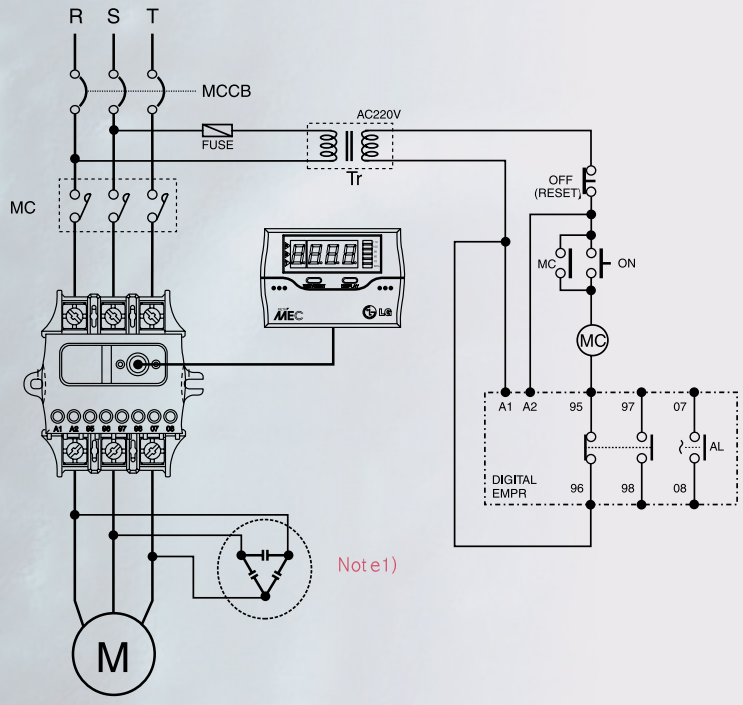
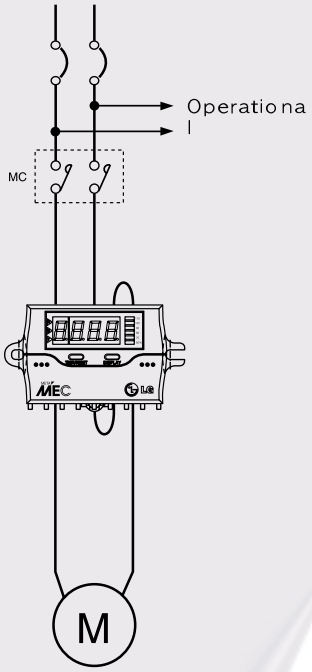
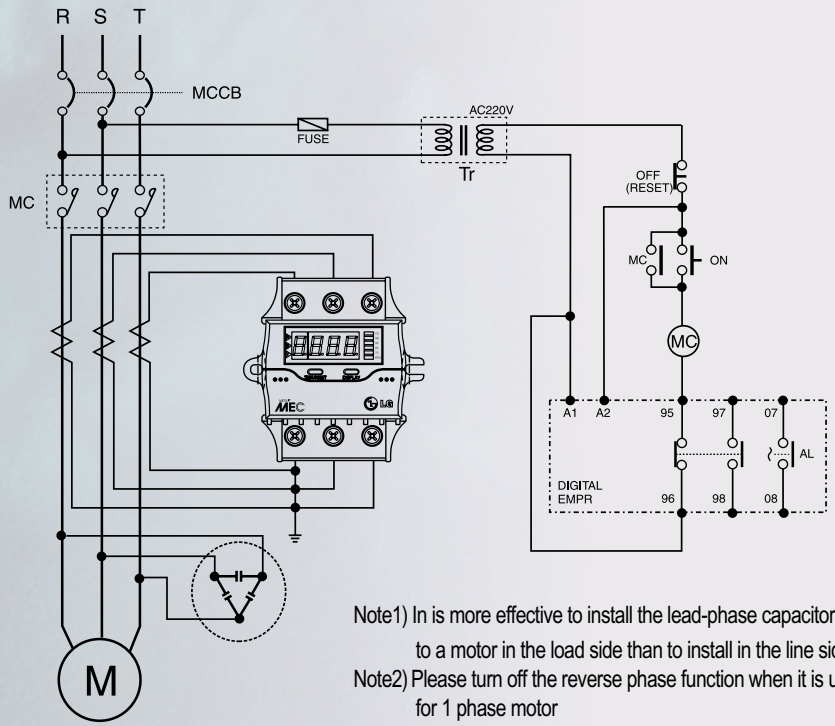
## Wiring method




## 1 Phase motor Note2)




## External CT combination




Note1) In is more effective to install the lead-phase capacitor close to a motor in the load side than to install in the line side

Note2) Please turn off the reverse phase function when it is used for 1 phase motor

# DMP-SZ/SEZ/TZ/TEZ

*Digital EMPR*

## DMP-SZ/ SEZ/ TZ/ TEZ

**Over-current/Under current/Phase failure/Asymmetry**
**Stall/Lock/Ground-fault**

- Unit type or extension type is available
  - Extension type:Remotely mounts the display unit on the panel surface
- 3 phase ampere meter function:Check the 3 phase current and setting value by press the display button
- Select the inverse time or definite time
- Easy to operate:Set the most function by the operation button and knod
- Display the causes of the fault and the values
- Ground fault protect function is added

### Protect function

| | | |
|---|---|---|
| **Over current** | Depend on setting time | Selectable the inverse/definite |
| **Phase loss** | Within 3seconds | Over 70% of the rate of unbalance |
| **Phase unbalance** | Within 5seconds | Over 50% of the rate of unbalance |
| **Phase reverse** | Within 0.1seconds | Function enable |
| **Stall** | Within 5seconds | Over 180% of the setting current |
| **Lock** | Within 0.5seconds | Setting 200~900% of rated current |
| **Under current** | Within 3seconds | Setting 30~70% of rated current |
| **Ground fault**(Note1) | Selectable 0.05~1.0seconds | Grounded current setting by dip s/w (100~2500mA) |

☞Lock protection is operated after setting D-time in case of definite time type

### Function selection

| FUNC | Sel | Description |
|---|---|---|
| **1. CHA** | Inv/dEF | Operating characteristics setting(Inverse/definite time type) |
| **2. dEF** | 0~30(S) | Setting the operating time(In definite type) |
| **3. r.P** | oFF/on | Phase reverse enable |
| **4. Und** | oFF/30~70(%) | Under current enable and setting |
| **5. g-F** | oFF/0.05~1.0(S) | Ground fault enable and setting |
| **6. Stl** | oFF/on | Stall enable |
| **7. Loc** | oFF/200~900(%) | Lock enable and setting |
| **8. Ct** | 1~120 | CT ratio setting |
| **9. P.F** | on/oFF | Phase fault enable |
| **Sto** | Sto | Store |

☞ 2.dEF is only displayed when dEF is selected in a 1.CHA mode ※ 2.dEF : Refer to page 10

☞ Ground fault sensitive current selection : Refer to page 15

### Ratings

| Model | | | DMP□-SZ | DMP□-SEZ | DMP□-TZ | DMP□-TEZ |
|---|---|---|---|---|---|---|
| **Type** | Wiring method | | Screw | | Tunnel | |
| | Panel mount | | Unit | Extension | Unit | Extension |
| **Operating characteristics** | | | Inverse/definite type | | | |
| **Alerting function** | | | Variable between 60 and 110% | | | |
| **Current range(A)** | DMP06-□ | | 0.5~6 | | | |
| | DMP60-□ | | 5~60 | | | |
| **Setting time** | Definite | Delay(D-T) | 0~60seconds | | | |
| | | Operating(O-T) | 0~30seconds | | | |
| | Inverse | | 0~60seconds | | | |
| | Reset type | | Manual reset | | | |
| **Operating voltage** | voltage | | AC 190~250V | | | |
| | Frequency | | 60Hz (50Hz) | | | |
| | ZCT input (07-08) | | 200mA/110mV | | | |
| **Aux. contacts** | OL | 2-SPST(95~98) | 3A/250Vac resistive load | | | |
| | AL | SPST(07-08) | 3A/250Vac resistive load | | | |
| **Indicate** | 7-segment | | 3-phase current value, fault cause | | | |
| | Bar-LED arrays | | Load ratio (60~110%) | | | |
| **Mounting** | | | 35mm Din-rail/Panel | | | |

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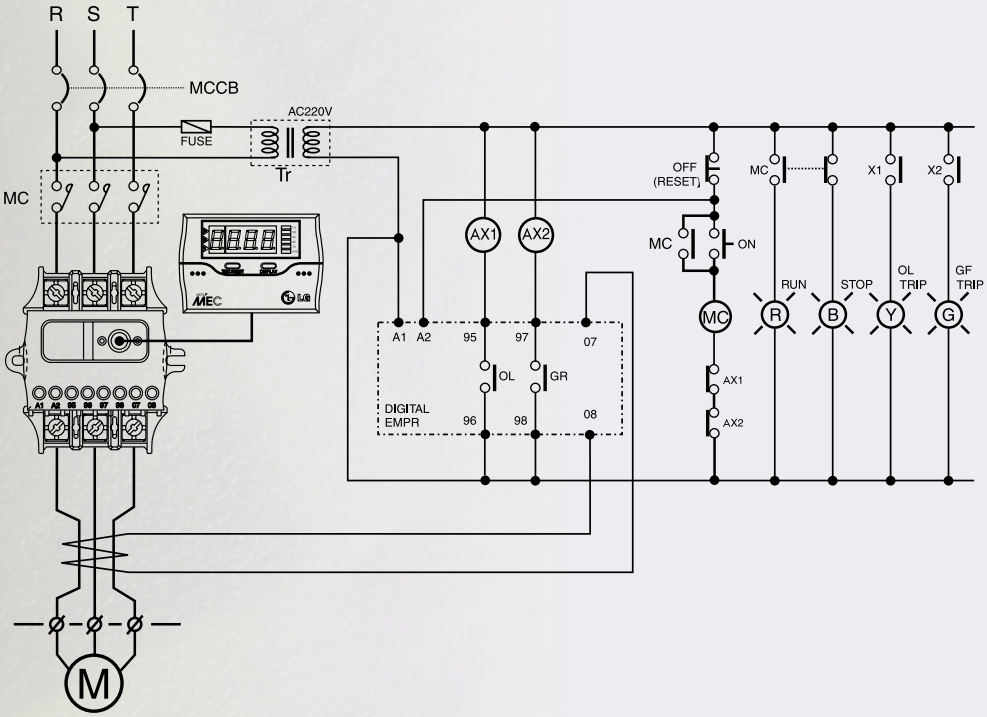
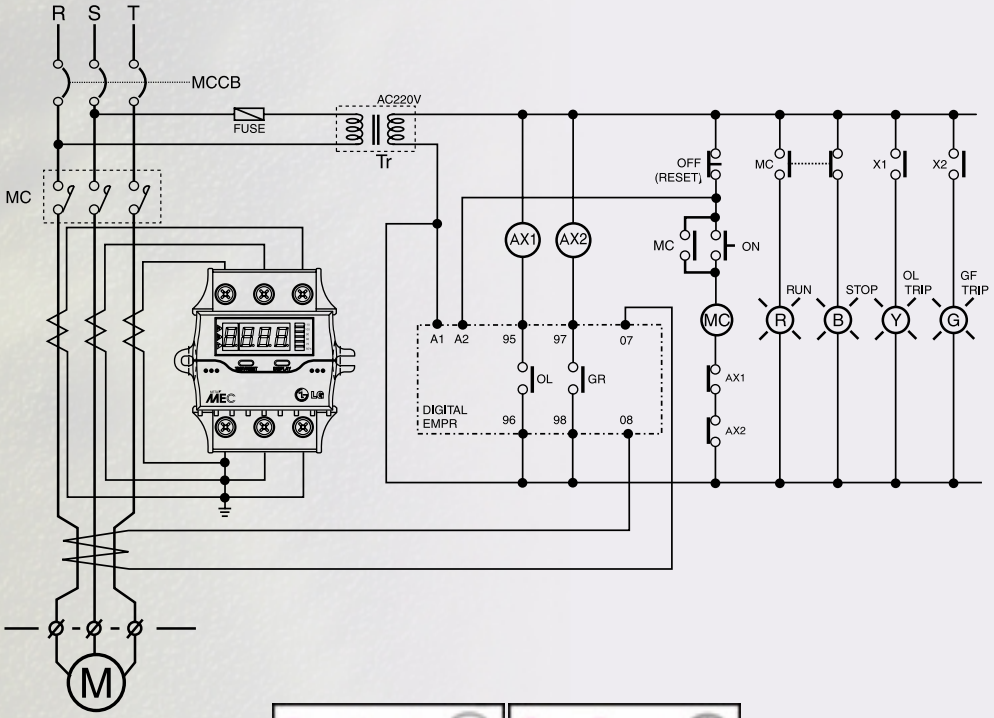
## Wiring method




## External CT combination

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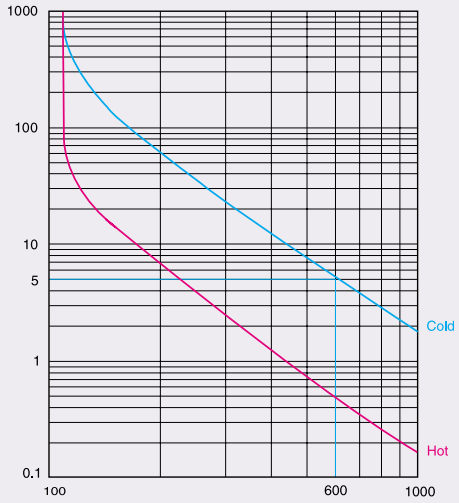
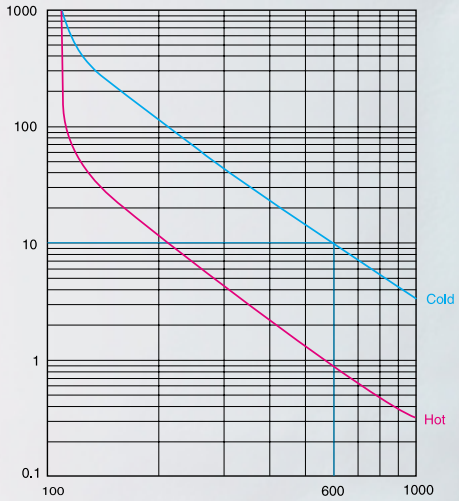
# Characteristics curve

*Digital EMPR*

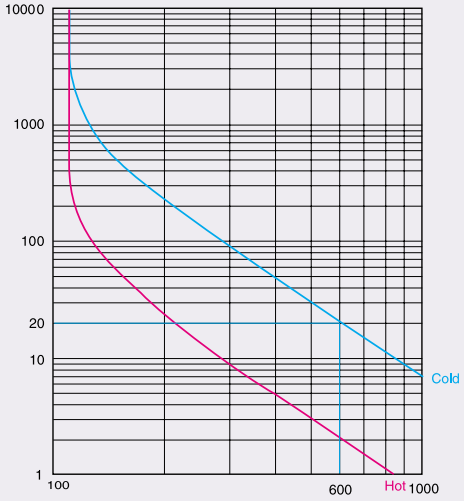
## Class 5



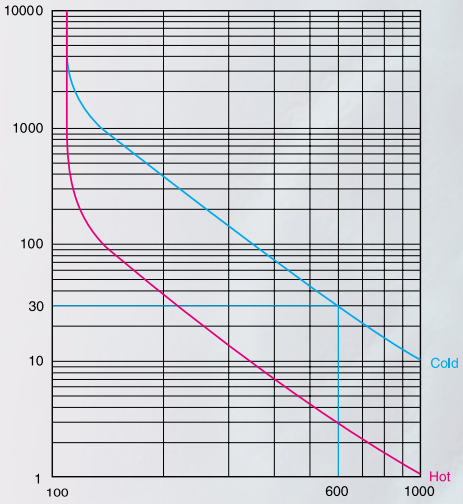

## Class10



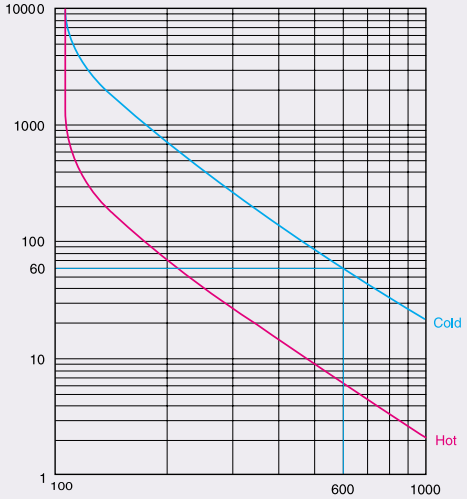

## Class 20



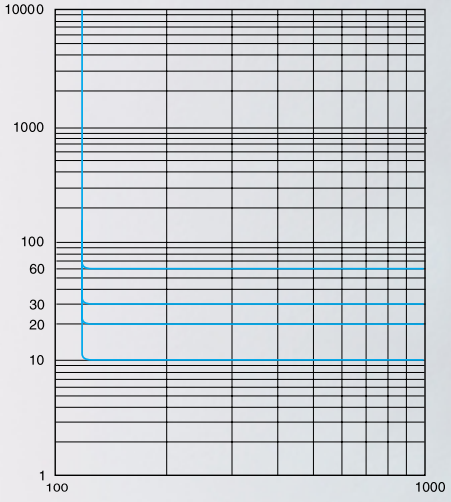

## Class30




## Class 60




## Definite time

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## DMP 06 - SEZ220

**DMP 06 – S E Z 220**

| Current setting range | |
|---|---|
| 06 | 0.5~6A |
| 60 | 5~60A |

| Wiring method | |
|---|---|
| S | Screw |
| T | Tunnel |

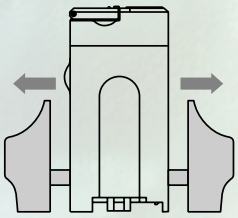
| Type | |
|---|---|
| - | Unit |
| E | Extension |

| Option | |
|---|---|
| Z | Ground fault |
| I | Short circuit |

| Operational power | |
|---|---|
| 220 | AC220V |
| 110 | AC110V |

*The standard length of a extension cable is 1m,
2m, 4m cable is optional
*For ground fault protection, ZCT (30 $\phi$,50 $\phi$,65 $\phi$,80 $\phi$)made by
LG is optionally required

1) Detach the screw terminal



Remove the 3 screws either in the line side or the load side and pull out the bus bsr.
If you remove the screw terminal, you can use it as a tunnel type digital EMPR, assemble it to the opposite sequence

**2) Select the ground fault sensitive current**

| *Sensitive current* | *Dip s/w* | | | |
|---|---|---|---|---|
| *(mA)* | *1* | *2* | *3* | *4* |
| *100* | ○ | ○ | ○ | ○ |
| *200* | *1* | ○ | ○ | ○ |
| *500* | ○ | *1* | ○ | ○ |
| *1000* | ○ | ○ | *1* | ○ |
| *1500* | ○ | ○ | ○ | *1* |
| *2000* | ○ | ○ | *1* | *1* |
| *2500* | *1* | *1* | *1* | *1* |

Note) High sensitive current(30~300mA)
is optional

LG constantly endeavors to improve our products, so that information in this catalog is subject to change without notice.

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